

Test

1

1 cm = micrometer

- (a) 10^2 (b) 10^4 (c) 10^6 (d) 10^8

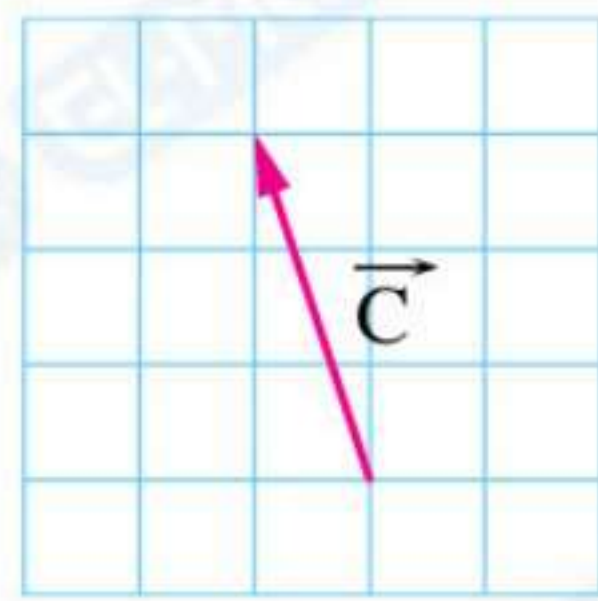
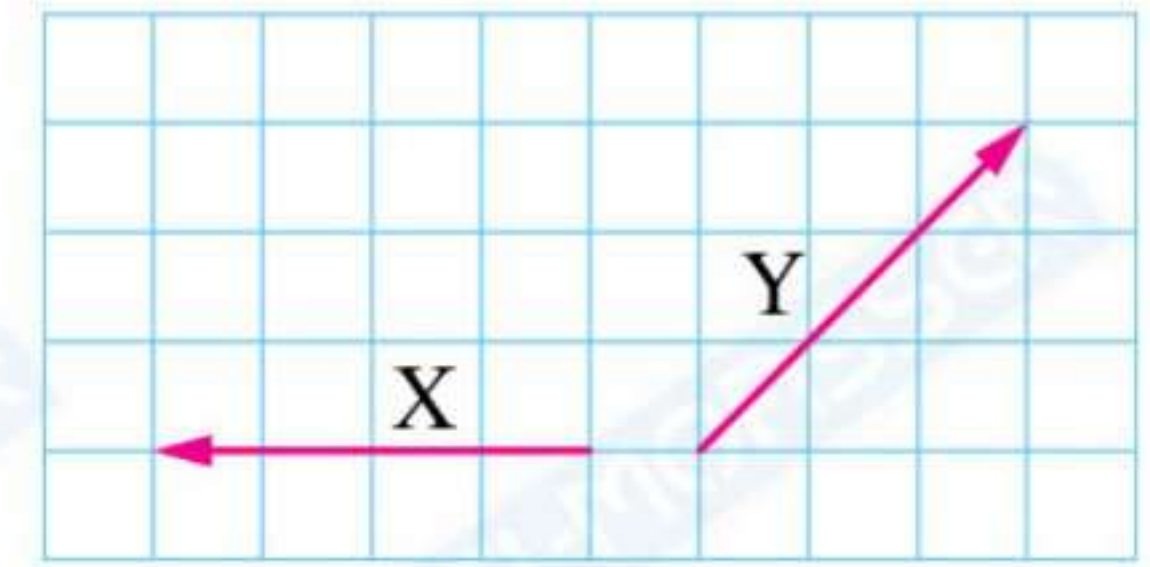
2 If an object moved along the circumference of a circle such that its displacement after half cycle becomes 2π m, then the value of the covered distance is

- (a) π m (b) $\frac{\pi}{2}$ m (c) π^2 m (d) 2π m

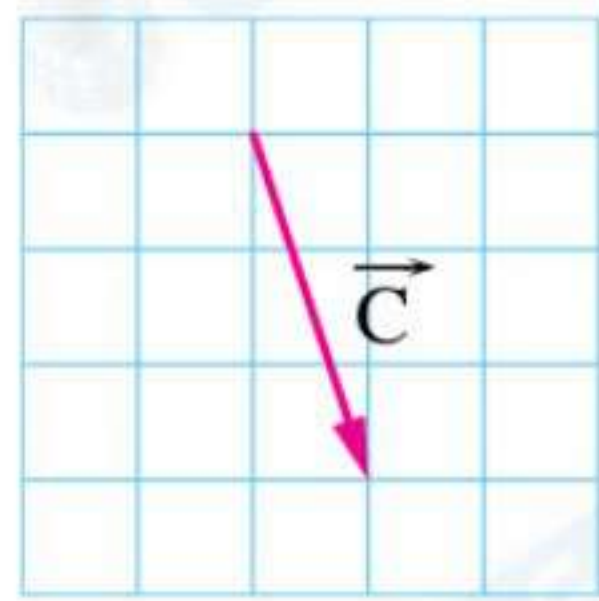
3 If $A = (2 \pm 0.01)$ m and $B = (80 \pm 2)$ cm, then the value of $(A + B)$ equals

- (a) (80.2 ± 2.01) m (b) (82 ± 2.01) cm
(c) (2.8 ± 2.01) cm (d) (2.8 ± 0.03) m

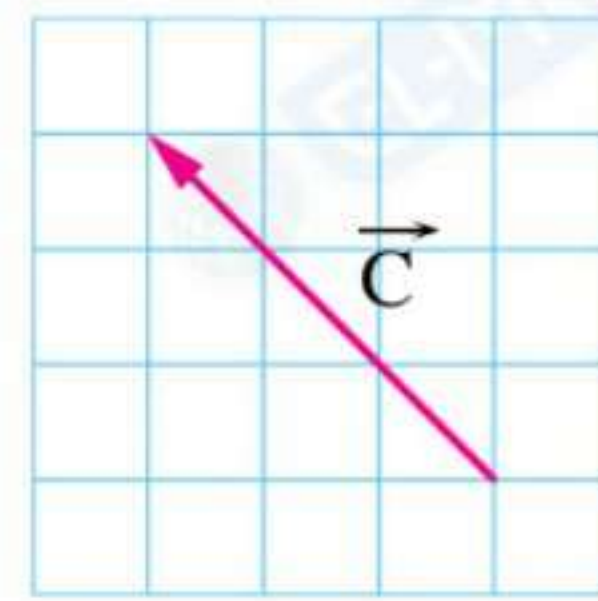
4 The opposite figure represents two vectors \vec{X} , \vec{Y} from the same type, which of the following vectors represents the resultant vector \vec{C} (Where: $\vec{C} = \vec{X} + \vec{Y}$)?



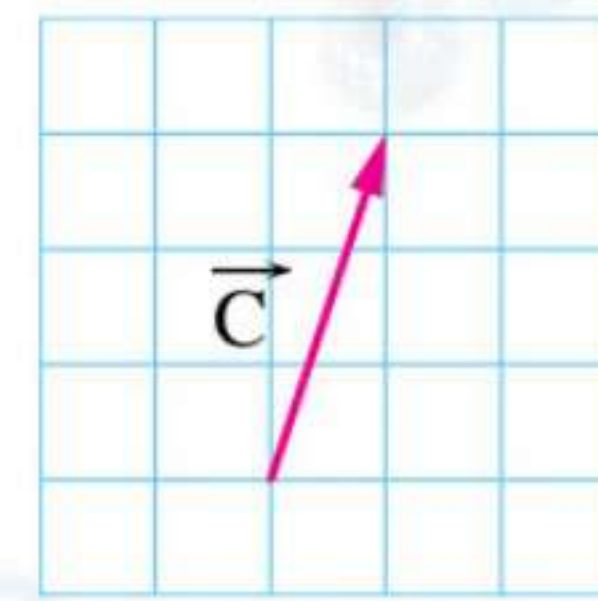
(a)



(b)



(c)



(d)

5 The most accurate tool for measuring the time taken by an object to fall from the top of a building is



(a)



(b)



(c)



(d)

6 If the dimensional formula of the physical quantity (A) is $M^2 L T^{-2}$ and the dimensional formula of the physical quantity (B) is $M^2 L T^{-2}$, so the dimensional formula of the quantity $(4A - 2B)$ is

- (a) $M^4 L^2 T^{-4}$ (b) $M^{-4} L^{-2} T^4$
(c) $M^2 L T^{-2}$ (d) has no physical meaning

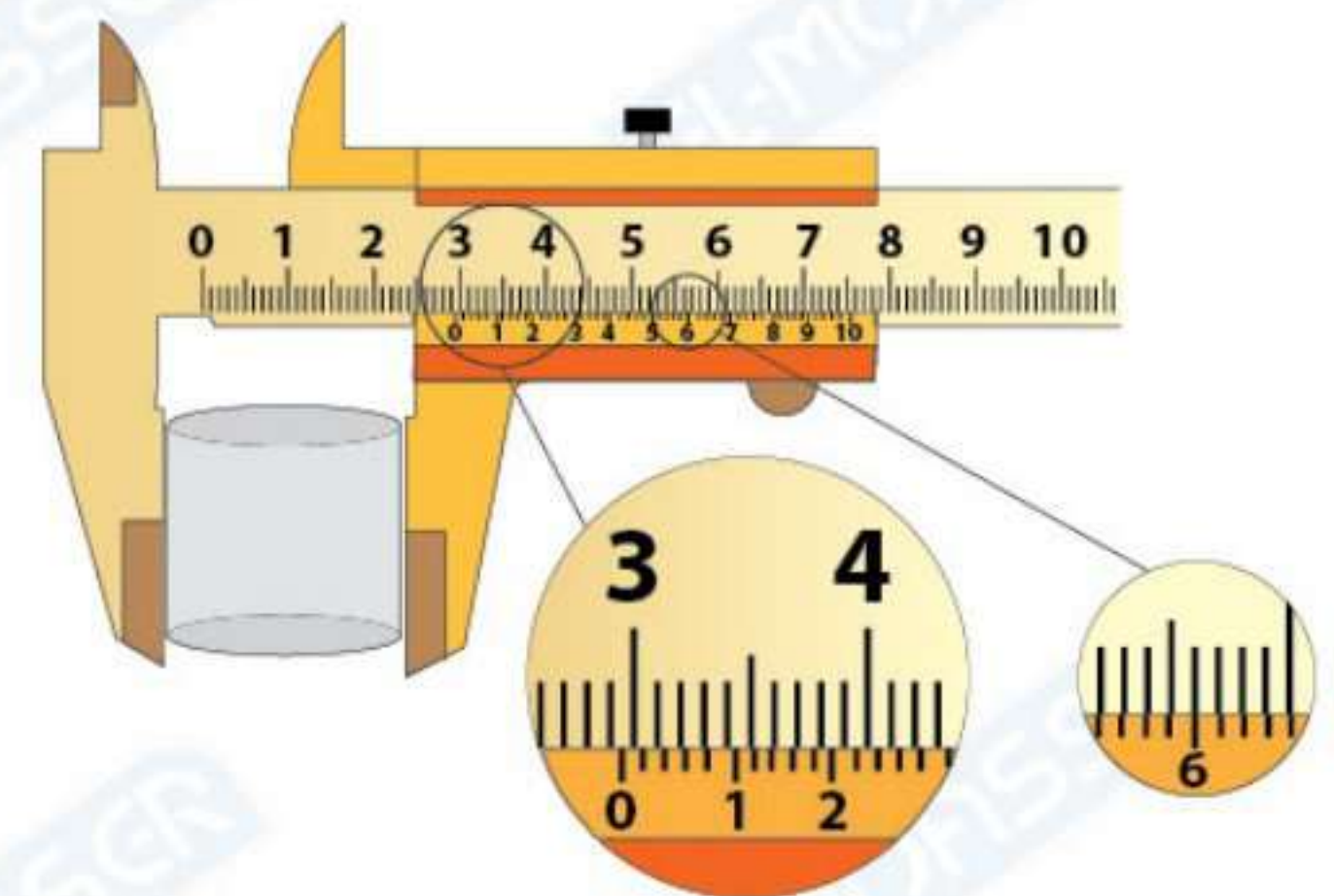
- 7 Two vectors \vec{A} and \vec{B} of the same type are equal in magnitude and perpendicular on each other, then the operation that makes their product

	Maximum	Zero
(a)	$\vec{A} \cdot \vec{B}$	$\vec{A} - \vec{B}$
(b)	$\vec{A} \cdot \vec{B}$	$\vec{A} \wedge \vec{B}$
(c)	$\vec{A} \wedge \vec{B}$	$\vec{A} - \vec{B}$
(d)	$\vec{A} \wedge \vec{B}$	$\vec{A} \cdot \vec{B}$

- 8 A group of students measured the density of a liquid several times, then they calculate the average of their readings. **Explain why** the students calculate the average of their readings.

- 9 The opposite figure illustrates a vernier caliper used to measure the radius of a metallic cylinder.

From the figure find the measured value for the thickness of the cylinder.



- 10 When the density of a cube was calculated, the percentage of error in measuring its mass was 2 % and the percentage of error in measuring its side length was 0.5 %, so find the percentage of error in calculating the density of the cube material.

(Knowing that: $\text{Density} = \frac{\text{Mass}}{\text{Volume}}$)

Test

2

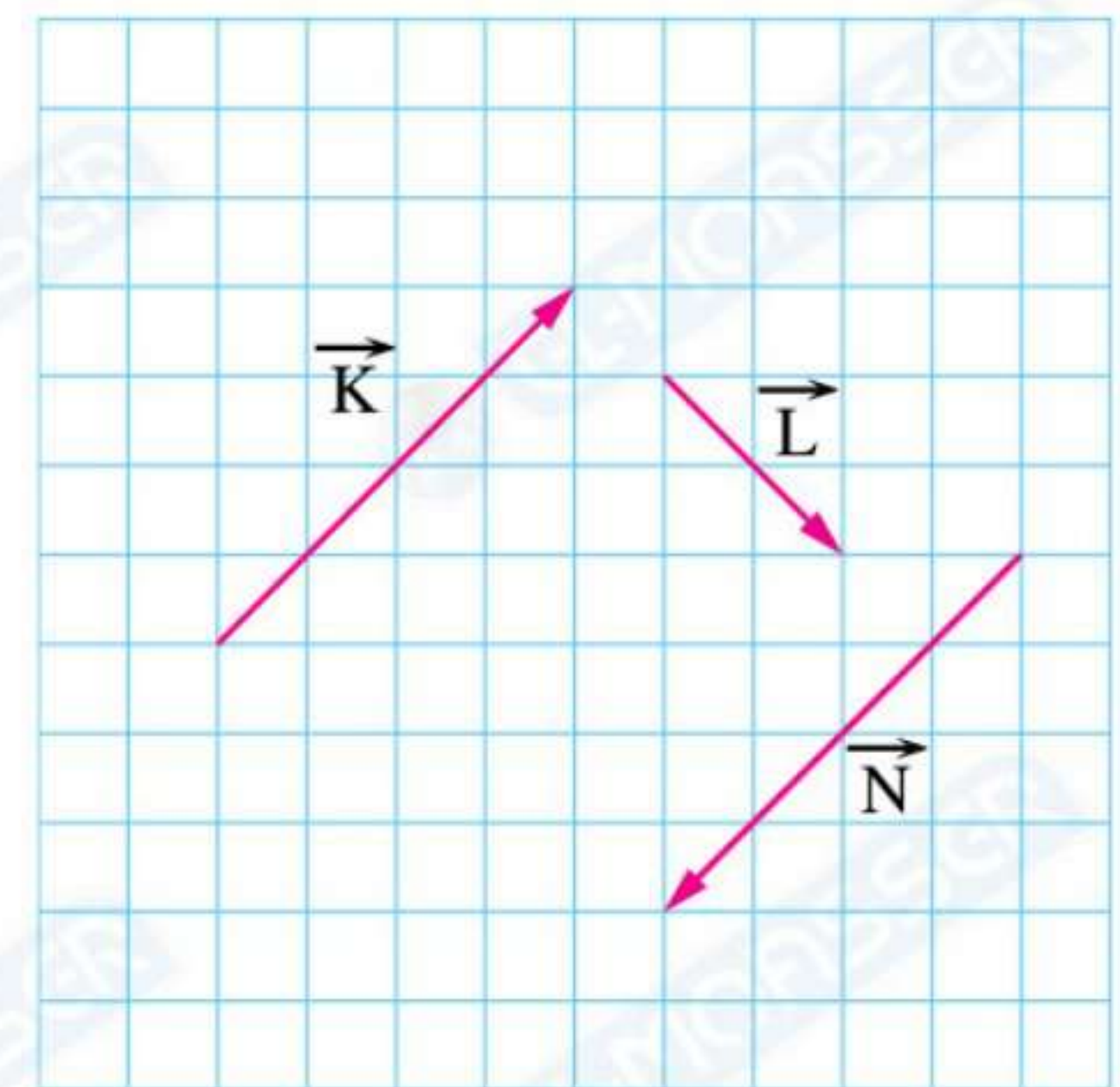
1 When the density of a liquid is measured by a hydrometer, it is found to be $(10^3 \pm 1) \text{ kg/m}^3$.

So,

	The type of measurement	The percentage of error in measurement
(a)	direct	0.1 %
(b)	direct	1 %
(c)	indirect	0.1 %
(d)	indirect	1 %

2 The opposite figure illustrates three vectors \vec{K} , \vec{L} and \vec{N} , which of the following equations is incorrect?

- (a) $\vec{K} + \vec{N} = 0$
- (b) $\vec{K} - \vec{N} = 2 \vec{K}$
- (c) $\vec{K} = \vec{N}$
- (d) $\vec{K} + \vec{L} + \vec{N} = \vec{L}$



3 The scalar product of two vectors and the magnitude of their vector product equalize when the angle between the two vectors is

- (a) 75°
- (b) 60°
- (c) 45°
- (d) 30°

4 If $x = 250 \text{ ms}$, $y = 1500 \mu\text{s}$, then the value of $(x + y)$ equals

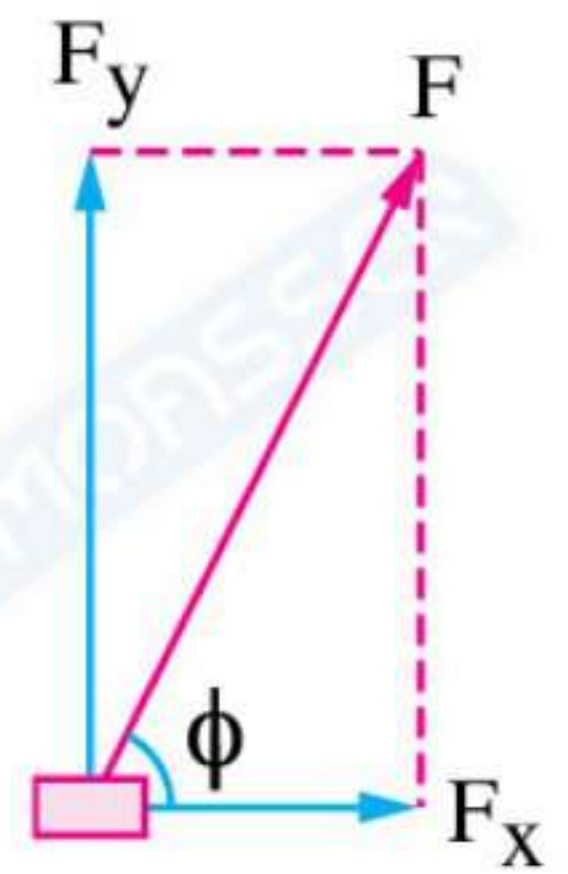
- (a) 0.2515 s
- (b) 4 s
- (c) 250.15 s
- (d) 1750 s

5 If the height of a student is $(1.8 \pm 0.05) \text{ m}$ and the height of another student is $(1.95 \pm 0.05) \text{ m}$, so the second student is taller than the first student by

- (a) $(3.75 \pm 0.05) \text{ m}$
- (b) $(3.75 \pm 0.1) \text{ m}$
- (c) $(0.15 \pm 0.1) \text{ m}$
- (d) $(0.15 \pm 0.05) \text{ m}$

6 In the opposite figure, if $F_y = 2F_x$, then the value of ϕ equals

- (a) 60°
- (b) 37.67°
- (c) 45°
- (d) 63.43°

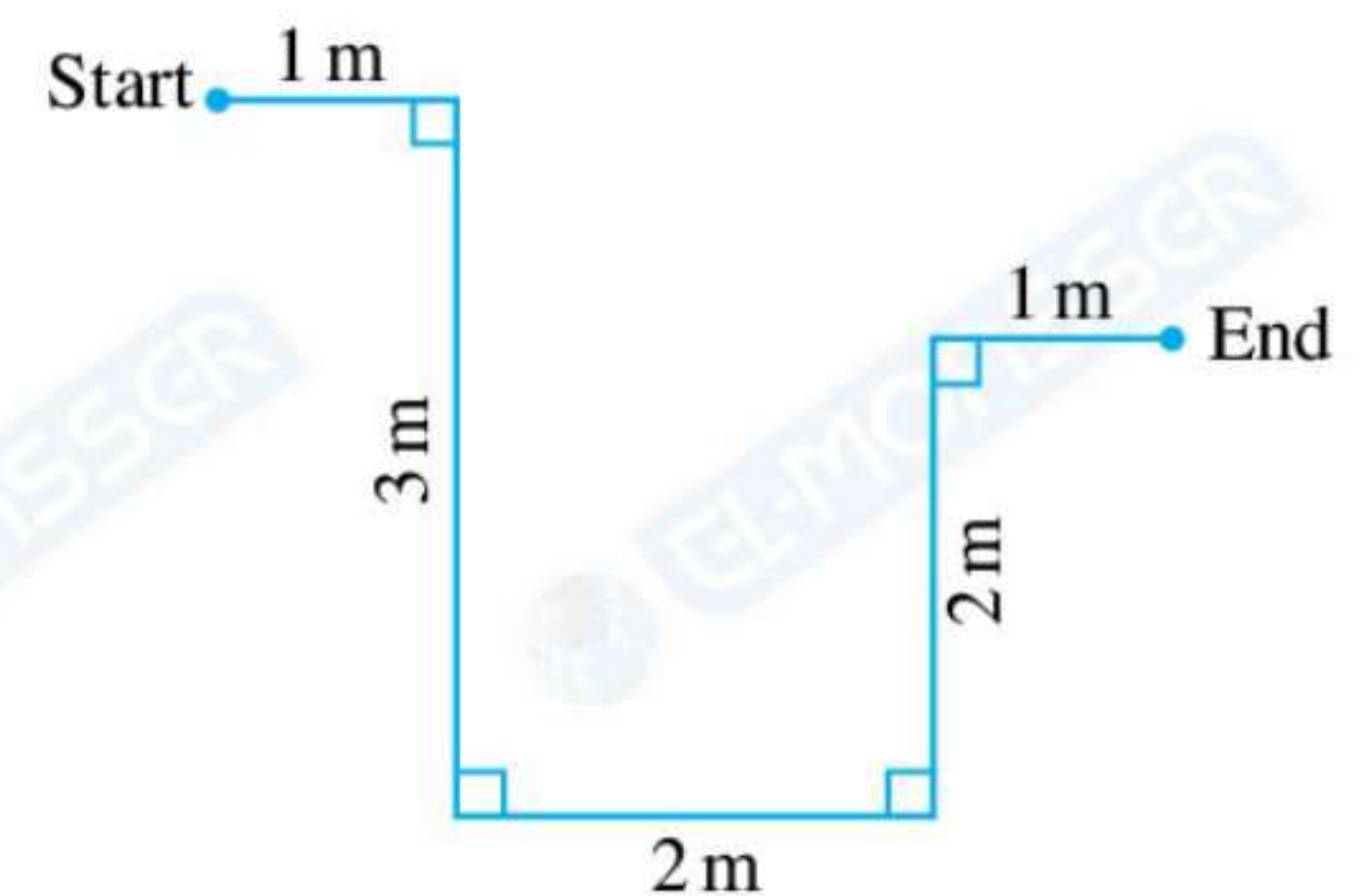


7 A group of students measure the velocity of a moving body, which of these measurements is more accurate?

- (a) (350 ± 20) m/s
- (b) (340 ± 15) m/s
- (c) (335 ± 10) m/s
- (d) (320 ± 10) m/s

8 A metallic ball of radius r is dropped into a tank of water, if its velocity in water was v and it is affected by a resistance force given by the relation $F = Krv$ where K is constant, **so find** the measuring unit of constant K . (Knowing that: $[F] = MLT^{-2}$)

9 The opposite figure represents the path of a moving body, **calculate** the value of the total displacement covered by the body.



10 The radius of a circle is measured and it was found to be (10.5 ± 0.2) m, then **calculate** the area of the circle. (Knowing that: The area of the circle = πr^2)

Answers of Test 1

1

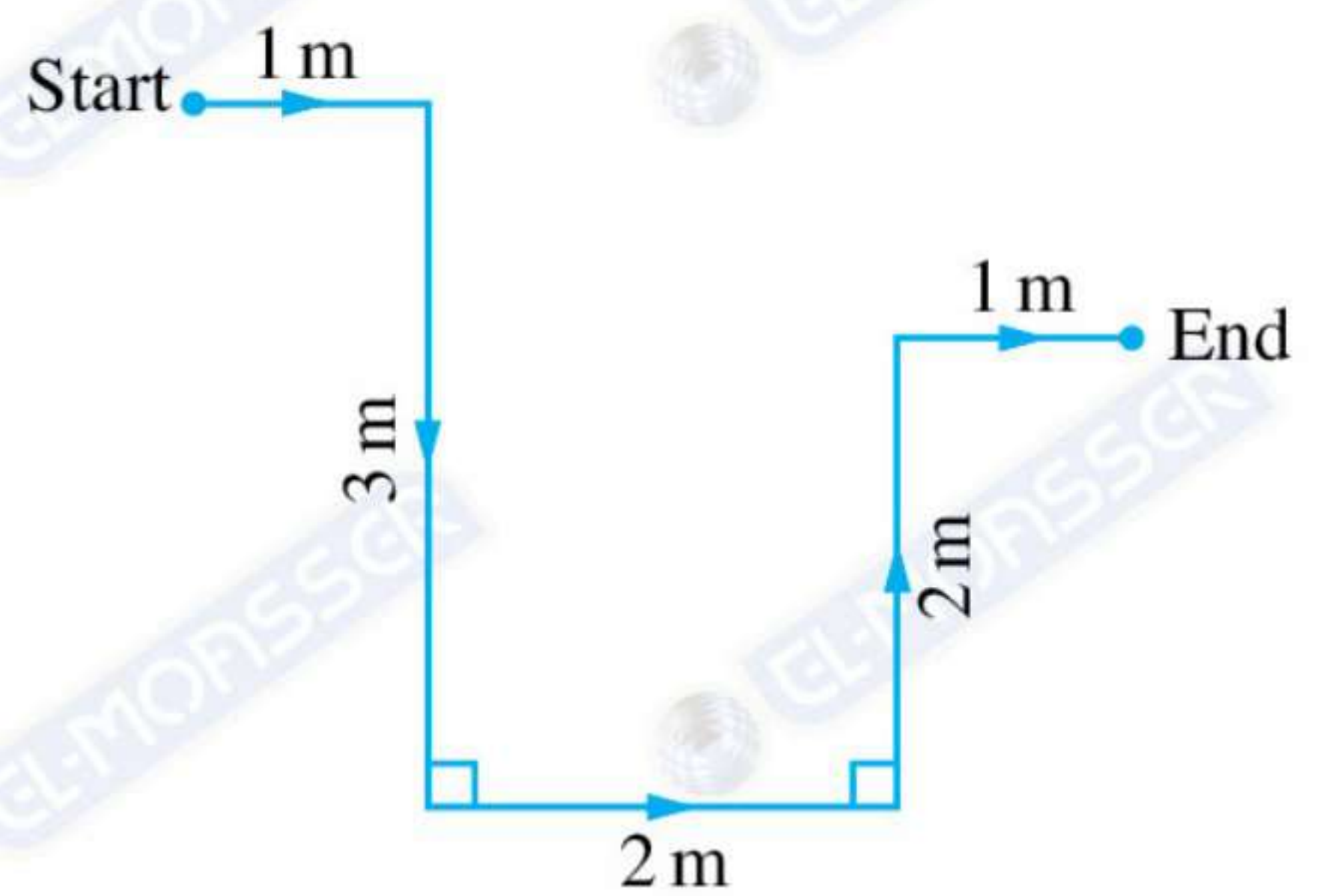
- 1 (b) 10^4 2 (c) $\pi^2 \text{ m}$ 3 (d) $(2.8 \pm 0.03) \text{ m}$ 4 (a)
- 5 (c) 6 (c) $\text{M}^2 \text{L T}^{-2}$ 7 (d) $\vec{A} \wedge \vec{B}, \vec{A} \cdot \vec{B}$
- 8 To reduce the error of measurement.
- 9 * Reading of the fixed scale : $X = 29 \text{ mm} = 2.9 \text{ cm}$
 * Reading of the sliding scale : $x = 6 \times 0.1 = 0.6 \text{ mm} = 0.06 \text{ cm}$
 * Diameter of the cylinder : $d = X + x = 2.9 + 0.06 = 2.96 \text{ cm}$
- 10 The relative error in measuring volume : $r_V = 3 r_L = 3 \times 0.5 = 1.5 \%$
 The relative error in measuring density : $r = r_V + r_m = 1.5 + 2 = 3.5 \%$

Answers of Test 2

2

- 1 (a) direct, 0.1 % 2 (c) $\vec{K} = \vec{N}$ 3 (c) 45° 4 (a) 0.2515 s
- 5 (c) $(0.15 \pm 0.1) \text{ m}$ 6 (d) 63.43° 7 (c) $(335 \pm 10) \text{ m/s}$
- 8 $\because F = Krv$ $\therefore [K] = \frac{[F]}{[rv]} = \frac{\text{MLT}^{-2}}{\text{LLT}^{-1}} = \text{ML}^{-1} \text{T}^{-1}$
- \therefore The measuring unit of constant K is $\text{kg} \cdot \text{m}^{-1} \cdot \text{s}^{-1}$

9 $d_x = 1 + 2 + 1 = 4 \text{ m}$
 $d_y = 3 - 2 = 1 \text{ m}$
 $d_{\text{total}} = \sqrt{d_x^2 + d_y^2}$
 $= \sqrt{(4)^2 + (1)^2}$
 $= \sqrt{17} \text{ m}$



10 $A_o = \pi R_o^2 = \frac{22}{7} \times (10.5)^2 = 346.5 \text{ m}^2$
 $r_A = 2 r_R = 2 \times \frac{0.2}{10.5} = \frac{4}{105}$
 $\Delta A = r_A A_o = \frac{4}{105} \times 346.5 = 13.2 \text{ m}^2$
 $A = (A_o \pm \Delta A) = (346.5 \pm 13.2) \text{ m}^2$

Test 1

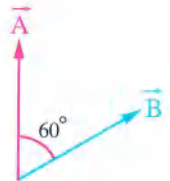


For the first month

Choose the correct answer (1 ; 7) :

- 1 Which of the following pairs of quantities represent two fundamental physical quantities?
- (a) Force and displacement. (b) Absolute temperature and speed.
 (c) Amount of substance and time. (d) Luminosity and volume.

- 2 The opposite figure illustrates two vectors \vec{A} , \vec{B} , so the ratio between their scalar product and the magnitude of their vector product equals



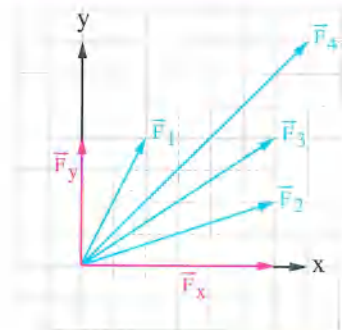
- (a) $\frac{1}{\sqrt{3}}$ (b) $\frac{\sqrt{3}}{1}$ (c) $\frac{1}{2}$ (d) $\frac{2}{1}$

- 3 A solid cylinder that has a base radius (r) of 5 cm and a height (h) of 20 cm is made of iron that has a density of 7800 kg/m^3 , so the mass of the cylinder equals

(Given that: the volume of a cylinder = $\pi r^2 h$, density = $\frac{\text{mass}}{\text{volume}}$, $\pi = \frac{22}{7}$)

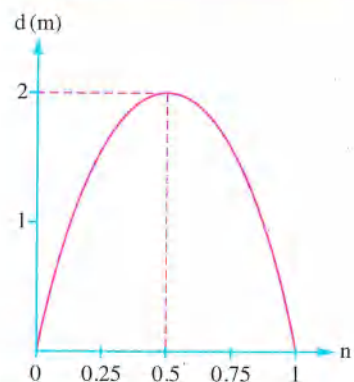
- (a) $1.23 \times 10^2 \text{ g}$ (b) $2.45 \times 10^3 \text{ g}$ (c) $1.23 \times 10^4 \text{ g}$ (d) $1.23 \times 10^5 \text{ g}$

- 4 In the opposite figure, which of the vectors \vec{F}_1 , \vec{F}_2 , \vec{F}_3 or \vec{F}_4 represents the resultant of the two components \vec{F}_x and \vec{F}_y ?



- (a) \vec{F}_1 (b) \vec{F}_2
 (c) \vec{F}_3 (d) \vec{F}_4

- 5 The opposite graph represents the relation between the magnitude of displacement (d) for a body moving in a circular path and the number of revolutions (n) made by the body, so the distance covered by the body through a complete revolution equals



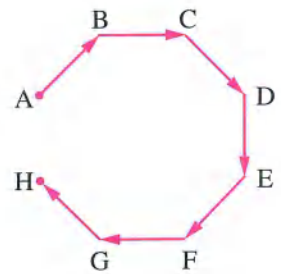
- (a) 2 m (b) $\pi \text{ m}$
 (c) 4 m (d) $2 \pi \text{ m}$

6 If $x = (100 \pm 0.01)$ m and $y = (200 \pm 0.03)$ m, the absolute error in calculating the quantity $(y - x)$ equals

- (a) 0.04 m (b) 0.03 m (c) 0.02 m (d) 0.01 m

7 The opposite figure illustrates the path of a body while moving on an octagon of side length 10 m, so the total displacement of the body equals

- (a) 70 m in direction \vec{AH}
 (b) 70 m in direction \vec{HA}
 (c) 10 m in direction \vec{AH}
 (d) 10 m in direction \vec{HA}



Answer the following questions (8 : 10) :

8 Given that the measuring unit of acceleration is m/s^2 and its dimensional formula is $L^x T^y$, **what** are the values of x and y ?

.....

9 Two vectors \vec{A} and \vec{B} have a resultant vector \vec{C} . The horizontal and vertical components of vector \vec{A} respectively are 3 units and 4 units while the horizontal and vertical components of vector \vec{B} respectively are 6 units and 8 units, **calculate** the magnitude of vector \vec{C} .

.....

10 **Why**, when making a measurement, is it preferable to repeat the measurement several times then calculating the average of the obtained measurements?

.....

Test 2



For the first month

Choose the correct answer (1 : 7) :

1 Which of the following processes is an indirect measurement?

- (a) Measuring the mass of an object using a scale.
- (b) Measuring the volume of a liquid using a graduated cylinder.
- (c) Measuring the area of a room using meter tape.
- (d) Measuring the density of a liquid using a hydrometer.

2 If x and y are two physical quantities where the dimensional formula of x is $L T^{-2}$ and the dimensional formula of y is $M L^{-1}$, which row of the following table represents the dimensional formulae of the shown quantities?

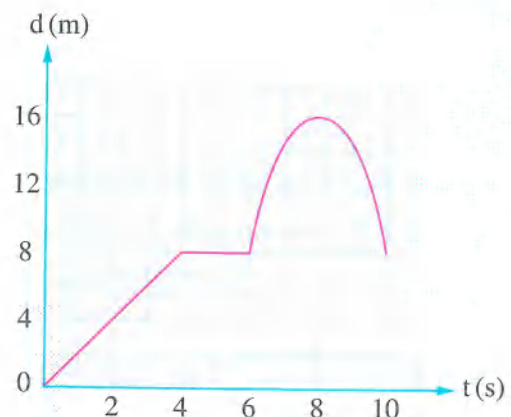
	$\frac{y}{x}$	$x + y$
(a)	$M L T^2$	$M L T^{-2}$
(b)	$M L^{-2} T^{-2}$	$M L T$
(c)	$M L T^2$	impossible
(d)	$M L^{-2} T^2$	impossible

3 If the scalar product of two vectors equals two thirds of the magnitude of their vector product, the angle between the two vectors equals

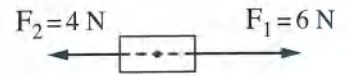
- (a) 30°
- (b) 56.3°
- (c) 33.69°
- (d) 45°

4 The opposite graph represents the relation between displacement (d) and time (t) for a body moving in a straight line, so the total distance covered by the body through the 10 s equals

- (a) 0
- (b) 8 m
- (c) 16 m
- (d) 24 m



5 The opposite figure illustrates two forces \vec{F}_1 and \vec{F}_2 acting on a body, so the net force affecting the body equals



- (a) 10 N in the direction of \vec{F}_2
- (b) 10 N in the direction of \vec{F}_1
- (c) 2 N in the direction of \vec{F}_2
- (d) 2 N in the direction of \vec{F}_1

6 Two vectors have equal magnitudes, the angle between them is 60° and their scalar product is 9 units, the magnitude of each of the two vectors equals

- (a) 3 units
- (b) $3\sqrt{2}$ units
- (c) 6 units
- (d) 9 units

7 Pressure is measured in the units of pascal which is equivalent to $\text{kg}\cdot\text{m}^{-1}\cdot\text{s}^{-2}$ while electric current intensity is measured in the units of ampere which is equivalent to coulomb/second, then which of the following statements is correct?

- (a) Pressure is a fundamental quantity, while electric current intensity is a derived quantity.
- (b) Pressure is a derived quantity, while electric current intensity is a fundamental quantity.
- (c) Both pressure and electric current intensity are fundamental quantities.
- (d) Both pressure and electric current intensity are derived quantities.

Answer the following questions (8 : 10) :

8 A vector \vec{A} makes an angle of 30° with its vertical component while its horizontal component equals 5 units, **calculate** the magnitude of vector \vec{A} .

.....

.....

9 The similarity of the dimensional formulae of both sides of an equation doesn't prove that the equation is correct. **Explain.**

.....

.....

10 An object moves in a straight line with a uniform speed such that it covers a distance of (10 ± 0.1) m through (5 ± 0.1) s, **calculate** the speed of the object.

(Given that: $\text{speed} = \frac{\text{distance}}{\text{time}}$)

.....

.....

- 1 (c) Amount of substance and time.
- 2 (a) $\frac{1}{\sqrt{3}}$
- 3 (c) 1.23×10^4 g
- 4 (c) \vec{F}_3
- 5 (d) $2\pi m$
- 6 (a) 0.04 m
- 7 (c) 10 m in direction \overline{AH}
- 8 \therefore The measuring unit of acceleration is $m.s^{-2}$.
 \therefore Its dimensional formula is $L T^{-2}$.
 $\therefore L^x T^y = L T^{-2}$
 $\therefore x = 1$, $y = -2$
- 9 $A = \sqrt{A_x^2 + A_y^2} = \sqrt{(3)^2 + (4)^2} = 5$ units
 $\tan \theta_A = \frac{4}{3}$ $\theta_A = 53.13^\circ$
 $B = \sqrt{B_x^2 + B_y^2} = \sqrt{(6)^2 + (8)^2} = 10$ units
 $\tan \theta_B = \frac{8}{6} = \frac{4}{3}$ $\theta_B = 53.13^\circ$
 $\therefore \theta_A = \theta_B$
 \therefore The two vectors \overline{A} and \overline{B} are in the same direction.
 $\therefore C = A + B = 5 + 10 = 15$ units
- Another Solution:**
- $C_x = A_x + B_x = 3 + 6 = 9$ units
 $C_y = A_y + B_y = 4 + 8 = 12$ units
 $C = \sqrt{C_x^2 + C_y^2} = \sqrt{(9)^2 + (12)^2} = 15$ units
- 10 To reduce the measuring error.

1. (c) Measuring the area of a room using meter tape.
2. (d) $ML^{-2}T^2$, impossible
3. (b) 56.3°
4. (d) 24 m
5. (d) 2 N in the direction of \vec{F}_1
6. (b) $3\sqrt{2}$ units
7. (b) Pressure is a derived quantity, while electric current intensity is a fundamental quantity.

8. $\therefore A_x = A \cos \theta$

$\therefore 5 = A \cos (90 - 30)$, $\therefore A = 10$ units

9. Because there might be numerical values in any of the sides of the equation, where numbers have no dimensions.

10. $r_v = r_d + r_t = \frac{\Delta d}{d_o} + \frac{\Delta t}{t_o} = \frac{0.1}{10} + \frac{0.1}{5} = 0.03$

$v_a = \frac{d_a}{t_o} = \frac{10}{5} = 2$ m/s

$\Delta v = r_v v_a = 0.03 \times 2 = 0.06$ m/s

$v = (v_o \pm \Delta v) = (2 \pm 0.06)$ m/s



First

Choose the correct answer

1 The suitable method for measuring the thickness of a thin sheet accurately is



(a)



(b)



(c)



(d)

2 The mass of a cube and the length of one of its sides were measured, where the relative error in measuring its mass was 2 % and the relative error in measuring its side length was 1.5 %, then the relative error in measuring its density is

(Knowing that: $\text{Density} = \frac{\text{Mass}}{\text{Volume}}$)

(a) 0.5 %

(b) 3.5 %

(c) 6.5 %

(d) 9.5 %

3 If the radius of a particle is 5.1 nm, then the diameter of the particle equals

(a) $10.2 \times 10^{-3} \mu\text{m}$

(b) $1.02 \times 10^{-7} \text{mm}$

(c) $10.2 \times 10^{-8} \text{m}$

(d) all the previous

4 If the dimensional formula of a physical quantity is $M^x L^x T^{x-3}$ where x is an integer number, by using the opposite table this quantity may be the

(a) force

(b) acceleration

(c) work

(d) velocity

The physical quantity	The measuring unit
Force	kg.m/s^2
Acceleration	m/s^2
Work	$\text{kg.m}^2/\text{s}^2$
Velocity	m/s

5 An empty large box of mass $(20 \pm 0.01) \text{kg}$, when a man sits inside the box, the mass of the box and the man together becomes $(0.1 \pm 0.001) \text{ton}$, so the mass of the man is

(a) $(120 \pm 0.009) \text{kg}$

(b) $(120 \pm 0.011) \text{kg}$

(c) $(80 \pm 1.01) \text{kg}$

(d) $(80 \pm 0.99) \text{kg}$

6 If the dimensional formula of a physical quantity is MLT^{-1} , then its measuring unit is

(a) kg.m.s

(b) kg.m.s^{-1}

(c) $\text{kg.m}^{-1}.\text{s}^{-1}$

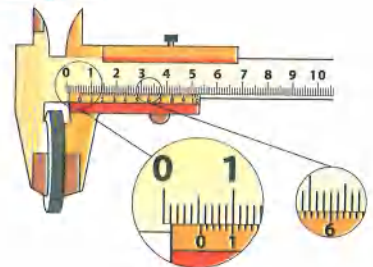
(d) $\text{kg.m}^{-1}.\text{s}$

- 7 How many bottles of volume 1000 cm^3 are needed to fill a tank of capacity 1 m^3 ?
 (a) 1 (b) 10 (c) 1000 (d) 100
- 8 If the dimensions of quantity x are $M^0 L^0 T$ and the dimensions of quantity y are $ML T^{-1}$, then the dimensions $ML T^{-2}$ describe the quantity
 (a) $x y$ (b) $x y^2$ (c) $\frac{x}{y}$ (d) $\frac{y}{x}$
- 9 The length of a rectangle was measured to be $(6 \pm 0.01) \text{ cm}$ and its width was measured to be $(4 \pm 0.01) \text{ cm}$, then the percentage of error in measuring the perimeter of the rectangle is
 (a) 0.2 % (b) 0.4 % (c) 0.8 % (d) 2 %
- 10 If the dimensions of A are $L^2 T$ and the dimensions of B are $L T^2$, then the dimensions of the quantity $A - 3 B$ are
 (a) $L^3 T^3$ (b) LT (c) $L^2 T^2$ (d) not defined
- 11 Which of the following lengths is larger?
 (a) 10^{-2} mm (b) $1 \mu\text{m}$ (c) 10^4 nm (d) 10^{-6} Gm
- 12 Given that: (F) is the force, (m) is the mass, (a) is the acceleration, $[F] = ML T^{-2}$ and $[a] = LT^{-2}$, which of the following equations might be correct?
 (a) $F = \frac{m}{a}$ (b) $F = ma^2$ (c) $F = \frac{a}{m}$ (d) $F = ma$
- 13 If the equation $(d = xv + \frac{1}{2} a y^2)$ describes the motion of a body, where the dimensions of the quantities d , v and a are L , LT^{-1} and LT^{-2} respectively, the dimensions of both x and y are

	Dimensions of x	Dimensions of y
(a)	T	T
(b)	T	T^2
(c)	T^{-1}	T
(d)	T^{-1}	T^2

- 14 The opposite figure shows a vernier caliper being used to measure the thickness of a metallic coin, then the measured value of the coin thickness is

- (a) 5.6 cm (b) 1.6 cm
 (c) 5.6 mm (d) 1.6 mm



Second

Answer the following questions

- 15 Why is not the glass used in manufacturing a standard meter?

- 16 “The absolute error is the best indicator for measurement accuracy”

Discuss the validity of the previous sentence.



First

Choose the correct answer

1 The magnitude of the vector product of the two vectors \vec{A} and \vec{B} in figure (1) is of the two vectors \vec{A} and \vec{B} in figure (2).

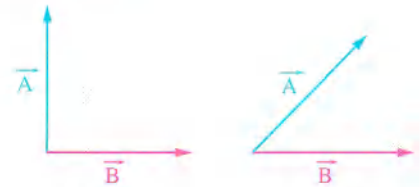
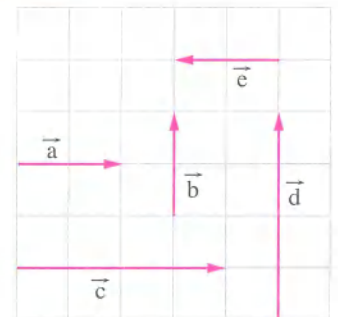


Figure (1)

Figure (2)

- (a) greater than the magnitude of the vector product
- (b) less than the magnitude of the vector product
- (c) equal to the magnitude of the vector product
- (d) equal to the scalar product

2 The following figure represents a group of vectors, then vector \vec{c} equals

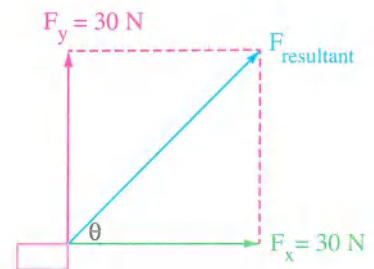


- (a) $1.5 \vec{b}$
- (b) $-2 \vec{e}$
- (c) \vec{d}
- (d) $-2 \vec{a}$

3 If the distance covered by a body moving in a circular path after $\frac{1}{8}$ revolution is 22 m, then its displacement during $\frac{1}{4}$ revolution equals

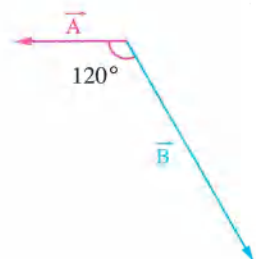
- (a) 28 m
- (b) 44 m
- (c) $14\sqrt{2}$ m
- (d) $28\sqrt{2}$ m

4 In the opposite figure, there are two perpendicular forces F_x and F_y , so the value of angle θ is



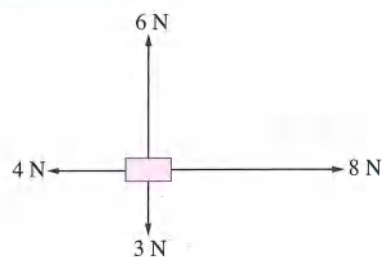
- (a) 30°
- (b) 60°
- (c) 45°
- (d) 90°

5 The opposite figure shows two vectors \vec{A} and \vec{B} that have magnitudes of 50 units and 150 units respectively. The magnitude and the direction of their vector product ($\vec{A} \wedge \vec{B}$) are and respectively.



- (a) 6495.19 units, perpendicular into the page
- (b) 6495.19 units, perpendicular out of the page
- (c) 3750 units, perpendicular into the page
- (d) 3750 units, perpendicular out of the page

6 The opposite figure shows four forces acting on a body, so the magnitude and the direction of their resultant are and respectively.

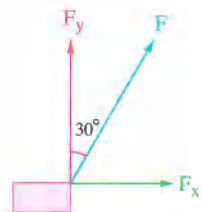


- (a) 8 N, makes angle 53.13° with the horizontal
- (b) 8 N, makes angle 45° with the horizontal
- (c) 5 N, makes angle 36.87° with the horizontal
- (d) 5 N, makes angle 30° with the horizontal

7 If the Earth orbits the Sun in a circular path of radius 1.5×10^{11} m and it completes one revolution every solar year, then the magnitude of the displacement of the Earth during three months is (Neglecting the motion of the Sun)

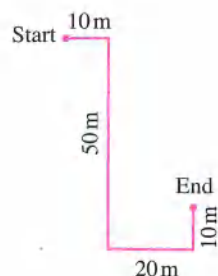
- (a) $\sqrt{2} \times 10^{11}$ m
- (b) 3×10^{11} m
- (c) $2\sqrt{2} \times 10^{11}$ m
- (d) 2.12×10^{11} m

8 In the opposite figure, force F is the resultant of the two forces F_x and F_y , then



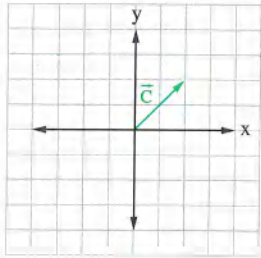
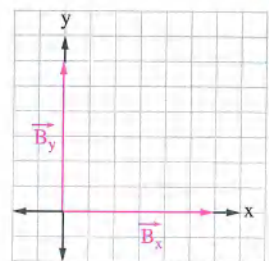
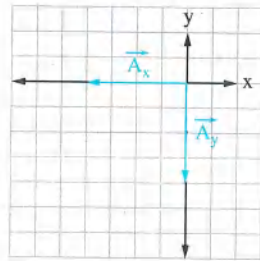
- (a) $F_x < F_y < F$
- (b) $F_y < F_x < F$
- (c) $F < F_y < F_x$
- (d) $F_y < F < F_x$

9 If a body moves in the shown path, then the magnitude of the displacement and the distance covered by it are and respectively.

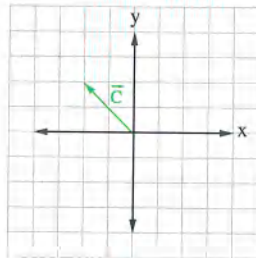


- (a) 50 m, 50 m
- (b) 50 m, 90 m
- (c) 90 m, 90 m
- (d) 90 m, 20 m

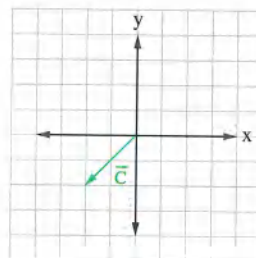
- 10 The opposite figures represent the components of vectors \vec{A} and \vec{B} , so which of the following figures may represent the resultant of the two vectors?



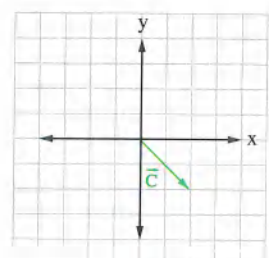
(a)



(b)



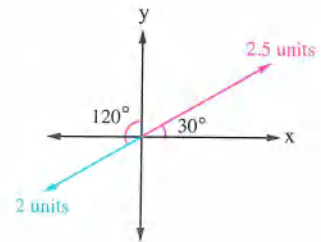
(c)



(d)

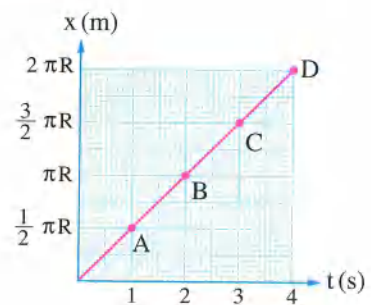
- 11 Two vectors of magnitudes 2 units and 2.5 units have directions as shown in the opposite figure, so the scalar product of the two vectors equals

- (a) 0 (b) $-\frac{5\sqrt{3}}{2}$ units
(c) - 5 units (d) 5 units



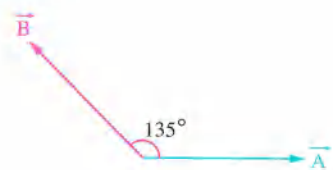
- 12 The opposite graph of distance versus time represents the motion of a body in a circular path of radius R, so the ratio between the magnitude of its displacement when it reaches point A and the magnitude of its displacement when it reaches point B equals

- (a) $\frac{1}{1}$ (b) $\frac{\sqrt{2}}{2}$
(c) $\sqrt{2}$ (d) $\frac{1}{2}$



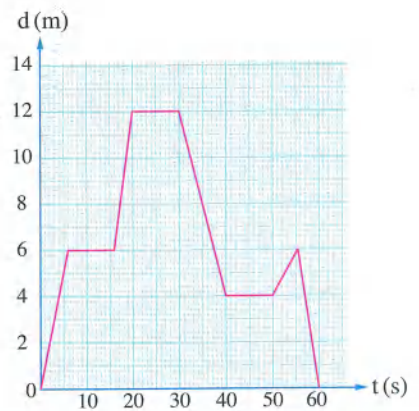
- 13 The opposite figure shows two vectors \vec{A} and \vec{B} , where $A = 8$ cm and the resultant of the two vectors is perpendicular to \vec{A} , so the magnitude of vector \vec{B} equals

- (a) $4\sqrt{2}$ cm (b) 4 cm
(c) 8 cm (d) $8\sqrt{2}$ cm



14 The opposite (displacement-time) graph describes the motion of a man moving in a straight track, so the distance covered by the man equals

- (a) 0
- (b) 12 m
- (c) 26 m
- (d) 28 m



Second Answer the following questions

15 Which of the following mathematical expressions is right? And which is wrong?

- (1) $(\vec{A} + \vec{B}) + (\vec{B} \cdot \vec{C})$
- (2) $(\vec{A} \cdot \vec{B}) + (\vec{B} \wedge \vec{C})$

16 Vector \vec{A} has a horizontal component of 4 cm and a vertical component of -7.5 cm. Vector \vec{B} has a horizontal component of -2.5 cm and a vertical component of 5 cm. If $\vec{C} = \vec{A} + \vec{B}$, find the components of vector \vec{C} .



First

Choose the correct answer

- 1 Which statement using prefixes of the base unit meter (m) is not correct?

(a) $1 \text{ pm} = 10^{-12} \text{ m}$	(b) $1 \text{ nm} = 10^{-9} \text{ m}$
(c) $1 \text{ Mm} = 10^6 \text{ m}$	(d) $1 \text{ Gm} = 10^{12} \text{ m}$

- 2 The best way to judge the accuracy of measurement is through
 - (a) the absolute error
 - (b) the relative error
 - (c) the product of the relative error and the absolute error
 - (d) all of them

- 3 If the vector product of two vectors $\vec{A} \wedge \vec{B} = \vec{C}$, hence $\vec{A} \cdot \vec{C} = \dots\dots\dots$

(a) \vec{A}	(b) \vec{B}
(c) \vec{C}	(d) 0

- 4 If the kinetic energy of a body is given by the relation $\frac{1}{2} mv^2$, then its dimensional formula is

(a) $ML^2 T^2$	(b) $ML T^{-2}$
(c) $ML^{-1} T^{-2}$	(d) $ML^2 T^{-2}$

- 5 The vernier caliper is used in measuring

(a) small masses	(b) the distance between cities
(c) small lengths	(d) large intervals of time

- 6 For the resultant of two vectors to be maximum, the angle between them must be

(a) 0°	(b) 60°
(c) 90°	(d) 180°

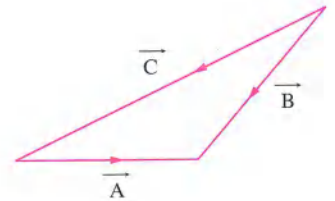
- 7 If two forces $F_1 = 4 \text{ N}$ and $F_2 = 3 \text{ N}$ acted on a body, then the net force on the body is

(a) 7 N	(b) 5 N
(c) 1 N	(d) between 1 N and 7 N

- 8 Two vectors \vec{F}_x and \vec{F}_y are perpendicular, if F_x is double vector F_y , so the angle θ between the resultant vector and \vec{F}_x equals
- (a) 26.56° (b) 30°
 (c) 60° (d) 63.43°

- 9 Which of the following choices describes the opposite figure?

- (a) $\vec{A} + \vec{B} = \vec{C}$
 (b) $\vec{B} + \vec{C} = \vec{A}$
 (c) $\vec{C} + \vec{A} = \vec{B}$
 (d) $\vec{A} + \vec{B} + \vec{C} = 0$



- 10 Hassan measured the length of a building by a meter tape, it was found to be (10 ± 0.1) m, then

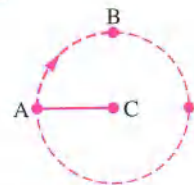
	The type of measurement	The absolute error	The relative error
(a)	direct	10 m	0.01
(b)	direct	0.1 m	0.01
(c)	indirect	10 m	0.001
(d)	indirect	0.1 m	10.1

- 11 The atom of gold has a diameter of 0.26 nm and the diameter of its nucleus is 5.6×10^{-3} pm, so the ratio of the diameter of the atom to that of its nucleus equals
- (a) 46.43 km (b) 46.43×10^3 (c) 46.43×10^3 m (d) 46.43

- 12 In the opposite figure:

If a body moved on the circle from point A to point B, the ratio between the covered distance and the displacement of the body equals

- (a) $\frac{\pi}{2}$ (b) π (c) $\frac{\pi}{2\sqrt{2}}$ (d) $\frac{\pi}{\sqrt{2}}$



- 13 If $x = (5 \pm 0.1)$ m and $y = (7 \pm 0.2)$ s, so $(\frac{x}{y})$ equals

- (a) $(71 \pm 3.4) 10^{-2}$ m/s (b) (0.71 ± 0.034) m
 (c) (0.71 ± 0.3) m/s (d) (0.71 ± 0.3) m



- 14 If the relative error in measuring the area of a room is 0.04 and the actual area is 45 m^2 , the absolute error in measuring the area is
- (a) 0.45 m^2 (b) 0.45 (c) 1.8 (d) 1.8 m^2

Second **Answer the following questions**

- 15 Cylinder of radius 5 cm and height 20 cm, is made of iron of density 7800 kg/m^3 , **find:**
- (a) The volume of the cylinder in nm^3 .
- (b) The mass of the cylinder in mg.

- 16 Two equal magnitudes of forces $|\vec{F}_1| = |\vec{F}_2|$ act on an object. If their resultant has a magnitude of 35 N and makes an angle 45° to \vec{F}_1 , **find:**
- (a) The magnitudes of F_1 and F_2
- (b) The dot product and the cross product of the two forces.
